

## IN THE CLAIMS:

Please amend the claims as follows:

1-28. (Canceled).

29. (Currently Amended) A computer-implemented method, ~~implemented on a computer, for automatically providing a marketing strategy to address at least one specified merchant objective, the objective corresponding to a specified time period and a specified budget, the strategy being implemented across at least one marketing channel, the strategy including at least one initiative for deploying an optimal marketing strategy to a customer, the computer-~~implemented method comprising:

inputting to a computer, ~~by a merchant, said at least one specified a merchant objective, said at least one~~ that is specified by a merchant, said merchant objective including said specified being associated with a time period and said specified budget as constraints;

contacting said merchant by said customer, said customer having a customer profile stored in said computer, said customer profile including a history of interactions between said customer and said merchant, each of said interactions corresponding to a state of said customer;

generating, by said computer, ~~a plurality of possible marketing strategies, each of said plurality of possible marketing strategies comprising a set of initiatives, which are deployed together in a given sequence for said specified time period, each of said initiatives being~~ associated with a marketing channel and being deployed for a variable time, and a total time of each of said possible marketing strategies being equal to a sum of all of said initiatives deployed,

wherein said initiatives include any of bundling of products, cross-sells, up-sells, coupons, discounts, promotions, advertisements, surveys, and customer feedback, and

wherein said generating of said possible marketing strategies is subject to constraints of cost and a specified total time of each of said possible marketing strategies;

determining recommending, by said computer, an optimal marketing strategy from said plurality a set of possible marketing strategies, each of said plurality along with a deployment

probability of each of said set of possible marketing strategies corresponding to a policy comprising a sequence of various actions taken at different states encountered during said specified time period to determine an optimal marketing strategy by using a modified Reinforcement Learning (RL) algorithm, wherein:

~~wherein each of said different states corresponds to a set of variables including any of customer profile, purchase frequency, and monetary value of purchase, associated with a customer at a time in said specified time period;~~

~~wherein said various actions include at least one randomized action;~~

~~wherein said various actions are constrained by a choice of a marketing channel;~~

~~wherein said various actions are deployed across said different states encountered during said specified time period to provide a plurality of policies;~~

~~wherein each of said plurality of policies is evaluated in a context of a reinforcement learning algorithm, in which values of each of said plurality of policies corresponds to a vector of total expected rewards, said total expected rewards comprising a sum of rewards corresponding to a monetary value for each of said various actions deployed across each of said different states during said specified time period;~~

~~wherein said determining, by said computer, of said optimal marketing strategy comprises determining an optimal policy for each state during said specified time period based on past data, wherein said determining of said optimal policy comprises:~~

~~evaluating, in order, said each state for said specified time period across each of said plurality of policies, corresponding to said sum of rewards; and~~

~~identifying said optimal policy, associated with said optimal marketing strategy, by a maximal value representing a maximal total expected reward for said optimal policy; and~~

~~outputting, by said computer, to said merchant, the optimal marketing strategy~~

said contacting said merchant by said customer corresponds to a perception of said state based on said customer profile;

said initiatives deployed by any of said possible marketing strategies correspond to actions;

a total expected reward is estimated for all states and all actions corresponding to said possible marketing strategies, and  
estimating said total expected reward for all states and all actions comprises:  
for every state, identifying a specific action that gives a maximal value for a corresponding total expected reward;  
selecting another action corresponding to a randomization of deployment for said specific action;  
recording a total expected reward for execution of said another action and a resultant state resulting from the action of said another action;  
updating an estimated value of said total expected reward with the said total expected reward for execution of said another action and said resultant state, according to a discount factor; and  
iteratively repeating said identifying a specific action, said selecting another action, said recording a total expected reward, and said updating an estimated value of said total expected reward, to determine a best value for said total expected reward that identifies said optimal marketing strategy;  
deploying, by said computer, said optimal market strategy to said customer;  
recording, by said computer, a response of said customer to said optimal market strategy in an updated customer profile; and  
iteratively repeating, by said computer, said recommending a set of said possible marketing strategies along with a deployment probability of each of said set of said possible marketing strategies, said deploying said optimal market strategy, and said recording a response of said customer, while said time period, specified by said merchant, has not expired, otherwise stopping.

30. (Currently Amended) The ~~computer implemented~~ method according to claim 29, wherein generating a ~~plurality of~~ said possible marketing strategies comprises:

selecting at least one initiative that enables an addressing of ~~the at least one specified~~ said merchant objective;

determining ~~sequences~~ a sequence in which selected initiatives are deployed, if more than one initiative is selected; and

combining the selected initiatives in ~~[[the]]~~ determined sequences to obtain ~~the plurality of said~~ possible marketing strategies.

31. (Currently Amended) The ~~computer implemented~~ method according to claim 30, further comprising varying parameters of said selected initiatives to generate new initiatives, corresponding to new states during said ~~specified~~ time period.

32. (Currently Amended) The ~~computer implemented~~ method according to claim 30, further comprising varying deployment time of said selected initiatives.

33. (Currently Amended) The ~~computer implemented~~ method according to claim 29, wherein ~~[[the]]~~ determining an optimal marketing strategy further comprises, ~~after said determining of said optimal policy for each state based on past data:~~

~~identifying a state of a customer, a customer visiting a merchant, or a customer being selected from a database of customers; and~~

~~identifying an optimal marketing strategy using the state of the customer, the identified optimal policy, and constraints corresponding to marketing channels.~~

34-37. (Canceled).

38. (Currently Amended) The ~~computer implemented~~ method according to claim 33, wherein ~~[[the]]~~ identifying ~~[[an]]~~ said optimal marketing strategy comprises:

~~identifying the optimal policy for an identified customer state;~~

~~assigning customer's preferences for marketing channels, cost, and effectiveness of different marketing channels, and the specified budget as constraints;~~

~~determining an optimal feasible policy based on the identified optimal policy and constraints corresponding to marketing channels; and~~

~~determining an optimal feasible marketing strategy from the optimal feasible policy.~~

39-42. (Canceled).

43. (Currently Amended) A computer system ~~that implements a computer implemented method for automatically providing a marketing strategy to address at least one specified merchant objective, the objective corresponding to a specified time period and a specified budget, the strategy being implemented across at least one marketing channel, the strategy including at least one initiative for deploying an optimal marketing strategy to a customer,~~ the computer system comprising:

a memory for storing ~~said at least one specified~~ a merchant objective, ~~which is inputted by a merchant via an input device and a communication bus, said at least one specified by a merchant, said merchant objective including said specified~~ being associated with a time period and ~~said specified budget as constraints~~ a customer profile including a history of interactions between said customer and said merchant, each of said interactions corresponding to a state of said customer; and

a microprocessor configured to:

~~generate a plurality of possible marketing strategies, each of said plurality of possible marketing strategies comprising a set of initiatives, which are deployed together in a given sequence for said specified time period, each of said initiatives being associated with a marketing channel and being deployed for a variable time, and a total time of each of said possible marketing strategies being equal to a sum of all of said initiatives deployed,~~

wherein said initiatives include any of bundling of products, cross-sells, up-sells, coupons, discounts, promotions, advertisements, surveys, and customer feedback, and

wherein said generating of said possible marketing strategies is subject to constraints of cost and a specified total time of each of said possible marketing strategies;

~~determine an optimal marketing strategy from said plurality~~ recommend a set of possible marketing strategies, each of said plurality along with a deployment probability of each of said set of possible marketing strategies corresponding to a policy comprising a sequence of

~~various actions taken at different states encountered during said specified time period, to determine an optimal marketing strategy by using a modified Reinforcement Learning (RL) algorithm, wherein:~~

~~wherein each of said different states corresponds to a set of variables including any of customer profile, purchase frequency, and monetary value of purchase, associated with a customer at a time in said specified time period,~~

~~wherein said various actions include at least one randomized action;~~

~~wherein said various actions are constrained by a choice of a marketing channel and said specified budget,~~

~~wherein said various actions are deployed across said different states encountered during said specified time period to provide a plurality of policies,~~

~~wherein each of said plurality of policies is evaluated in a context of a reinforcement learning algorithm, in which values of each of said plurality of policies corresponds to a vector of total expected rewards, said total expected rewards comprising a sum of rewards corresponding to a monetary value for each of said various actions deployed across each of said different states during said specified time period,~~

~~wherein said determining of said optimal marketing strategy comprises determining an optimal policy for each state during said specified time period based on past data, wherein said determining of said optimal policy comprises:~~

~~evaluating, in order, said each state for said specified time period across each of said plurality of policies, corresponding to said sum of rewards; and~~

~~identifying said optimal policy, associated with said optimal marketing strategy, by a maximal value representing a maximal total expected reward for said optimal policy; and~~

~~output, to said merchant, the optimal marketing strategy~~

~~said contacting said merchant by said customer corresponds to a perception of said state based on said customer profile;~~

~~said initiatives deployed by any of said possible marketing strategies correspond to actions;~~

a total expected reward is estimated for all states and all actions  
corresponding to said possible marketing strategies, and  
estimating said total expected reward for all states and all actions  
comprises:

- for every state, identifying a specific action that gives a maximal  
value for a corresponding total expected reward;
- selecting another action corresponding to a randomization of  
deployment for said specific action;
- recording a total expected reward for execution of said another  
action and a resultant state resulting from the action of said another action;
- updating an estimated value of said total expected reward with the  
said total expected reward for execution of said another action and said resultant state, according  
to a discount factor; and
- iteratively repeating said identifying a specific action, said  
selecting another action, said recording a total expected reward, and said updating an estimated  
value of said total expected reward, to determine a best value for said total expected reward that  
identifies said optimal marketing strategy;
- deploy said optimal market strategy to said customer;
- record a response of said customer to said optimal market strategy in an updated  
customer profile; and
- iteratively repeat said recommending a set of said possible marketing strategies  
along with a deployment probability of each of said set of said possible marketing strategies, said  
deploying said optimal market strategy, and said recording a response of said customer, while  
said time period, specified by said merchant, has not expired, otherwise stopping.

44. (Currently Amended) The computer system according to claim 43, wherein said  
 generating ~~a plurality of~~ possible marketing strategies comprises:  
 selecting at least one initiative that enables an addressing of ~~the at least one specified~~ said  
 merchant objective;

determining ~~sequences~~ a sequence in which selected initiatives are deployed, when more than one initiative is selected; and

for combining the selected initiatives in ~~[[the]]~~ determined sequences to obtain ~~the plurality of said~~ possible marketing strategies.

45. (Currently Amended) The computer system according to claim 43, wherein ~~[[the]]~~ identifying ~~[[an]]~~ said optimal marketing strategy comprises:

~~identifying a state of a customer, a customer visiting a merchant, or a customer being selected from a database of customers;~~

~~identifying an optimal policy for an identified customer state;~~

~~assigning customer's preferences for marketing channels, cost, and effectiveness of different marketing channels, and the specified budget as constraints;~~

~~determining an optimal feasible policy based on~~ identifying constraints corresponding to marketing channels; ~~and~~

~~determining an optimal feasible marketing strategy from the optimal feasible policy.~~

46-48. (Canceled).

49. (Currently Amended) A computer program storage ~~device~~ medium readable by computer, tangibly embodying a computer program of instructions executable by the computer to perform a ~~computer implemented method for automatically providing a marketing strategy to address at least one specified merchant objective, the objective corresponding to a specified time period and a specified budget, the strategy being implemented across at least one marketing channel, the strategy including at least one initiative~~ deploying an optimal marketing strategy to a customer, the ~~computer implemented~~ method comprising:

~~inputting to a computer, by a merchant, said at least one specified~~ a merchant objective, said at least one that is specified by a merchant, said merchant objective including said specified being associated with a time period and said specified budget as constraints;



contacting said merchant by said customer, said customer having a customer profile including a history of interactions between said customer and said merchant, each of said interactions corresponding to a state of said customer;

generating, by said computer, a plurality of possible marketing strategies, each of said plurality of possible marketing strategies comprising a set of initiatives, which are deployed together in a given sequence for said specified time period, each of said initiatives being associated with a marketing channel and being deployed for a variable time, and a total time of each of said possible marketing strategies being equal to a sum of all of said initiatives deployed,

wherein said initiatives include any of bundling of products, cross-sells, up-sells, coupons, discounts, promotions, advertisements, surveys, and customer feedback, and

wherein said generating of said possible marketing strategies is subject to constraints of cost and a specified total time of each of said possible marketing strategies;

determining recommending, by said computer, an optimal marketing strategy from said plurality a set of possible marketing strategies, each of said plurality along with a deployment probability of each of said set of possible marketing strategies corresponding to a policy comprising a sequence of various actions taken at different states encountered during said specified time period to determine an optimal marketing strategy by using a modified Reinforcement Learning (RL) algorithm, wherein:

wherein each of said different states corresponds to a set of variables including any of customer profile, purchase frequency, and monetary value of purchase, associated with a customer at a time in said specified time period;

wherein said various actions include at least one randomized action;

wherein said various actions are constrained by a choice of a marketing channel;

wherein said various actions are deployed across said different states encountered during said specified time period to provide a plurality of policies;

wherein each of said plurality of policies is evaluated in a context of a reinforcement learning algorithm, in which values of each of said plurality of policies corresponds to a vector of total expected rewards, said total expected rewards comprising a sum

~~of rewards corresponding to a monetary value for each of said various actions deployed across each of said different states during said specified time period;~~

~~wherein said determining, by said computer, of said optimal marketing strategy comprises determining an optimal policy for each state during said specified time period based on past data, wherein said determining of said optimal policy comprises:~~

~~evaluating, in order, said each state for said specified time period across each of said plurality of policies, corresponding to said sum of rewards; and~~

~~identifying said optimal policy, associated with said optimal marketing strategy, by a maximal value representing a maximal total expected reward for said optimal policy; and~~

~~outputting, by said computer, to said merchant, the optimal marketing strategy~~

said contacting said merchant by said customer corresponds to a perception of said state based on said customer profile;

said initiatives deployed by any of said possible marketing strategies correspond to actions;

a total expected reward is estimated for all states and all actions corresponding to said possible marketing strategies, and

estimating said total expected reward for all states and all actions comprises:

for every state, identifying a specific action that gives a maximal value for a corresponding total expected reward;

selecting another action corresponding to a randomization of deployment for said specific action;

recording a total expected reward for execution of said another action and a resultant state resulting from the action of said another action;

updating an estimated value of said total expected reward with the said total expected reward for execution of said another action and said resultant state, according to a discount factor; and

iteratively repeating said identifying a specific action, said selecting another action, said recording a total expected reward, and said updating an estimated value of

said total expected reward, to determine a best value for said total expected reward that identifies said optimal marketing strategy;

deploying said optimal market strategy to said customer;

recording a response of said customer to said optimal market strategy in an updated customer profile; and

iteratively repeating said recommending a set of said possible marketing strategies along with a deployment probability of each of said set of said possible marketing strategies, said deploying said optimal market strategy, and said recording a response of said customer, while said time period, specified by said merchant, has not expired, otherwise stopping.

50. (Currently Amended) The computer program storage ~~device~~ medium according to claim 49, wherein the generating ~~a plurality of~~ said possible marketing strategies comprises:

~~selecting at least one initiative that enables an addressing of the at least one specified~~ said merchant objective;

~~determining sequences~~ a sequence in which selected initiatives are deployed, when more than one initiative is selected; and

~~combining the selected initiatives in [[the]] determined sequences to obtain the plurality of~~ said possible marketing strategies.

51. (Currently Amended) The computer program storage ~~device~~ medium according to claim 49, wherein [[the]] determining an optimal marketing strategy further comprises:

~~identifying a state of a customer, a customer visiting a merchant, or a customer being selected from a database of customers;~~

~~identifying an optimal policy for an identified customer state;~~

~~assigning customer's preferences for marketing channels, cost, and effectiveness of different marketing channels, and the specified budget as constraints;~~

~~determining an optimal feasible policy based on~~ identifying constraints corresponding to marketing channels; ~~and~~

~~determining an optimal feasible marketing strategy from the optimal feasible policy.~~

52-56. (Canceled).